UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
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ART UNIT	PAPER NUMBER
2665	3

DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _24 October 2000_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-27_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-27_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _4_.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

An initialed and dated copy of Applicant's IDS form 1449, Paper No. 4, is

attached to the instant Office action.

Claim Rejections - 35 USC § 112, second paragraph

Claims 15, 21-27 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. Claims 15, 21-27 contain indefinite language. In

particular, they include the terms "more quickly", "more slowly", and "skipped". These

terms are indefinite. Clarification and/or correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as
> set forth in section 102 of this title, if the differences between the subject matter sought to be
> patented and the prior art are such that the subject matter as a whole would have been obvious
> at the time the invention was made to a person having ordinary skill in the art to which said
> subject matter pertains. Patentability shall not be negatived by the manner in which the invention
> was made.

1.   Claims 1, 12, 13, 21, 22, 24, 26, 27 are rejected under 35 U.S.C. 103(a) as being

unpatentable over LaVigne et al. (US 6,289,066). Regarding claims 1, 12, 13, 21, 22,

24, 26, 27, LaVigne discloses a system and method to retime signals between input and

output signals running at different rates comprising: storing a plurality of successive

words into storage locations in a circular memory (col. 4 lines 8-17: input clock writes

data into FIFO); reading the plurality of successive words out of storage locations in the

circular memory (col. 4 lines 17-21: output clock reads data out of FIFO); maintaining a

read pointer indicating a read location in the circular memory (fig. 2: extract (read)

pointer 27); maintaining a write pointer indicating a write location in the circular memory

(fig. 2: insert (write) pointer 26); comparing the read and write pointers to determine a

number of storage locations by which the write pointer leads the read pointer (col. 5:

lines 3-26); reading one of the storage locations twice in response to detecting that the

number of storage locations by which the write pointer leads the read pointer is less

than a predetermined minimum number (col. 5 lines 3-11; fig. 2 add region 29); and

overwriting one of the storage locations in response to detecting that the number of

storage locations by which the write pointer leads the read pointer is greater than a

predetermined maximum number (col. 5 lines 12-26; fig. 2 delete region 30).

LaVigne discloses a synchronizer system to retime and multiplex two input data

streams to one output stream. LaVigne does not explicitly disclose the synchronizer

system for retiming one input and one output. However, it is obvious from the figures

and disclosure that the system can be decomposed into one FIFO and its associated

pointer processing and fill word control logic to provide the required functions for

retiming one input to one output. All the features associated with the pointers and fill

word insertion and deletion would apply to adapt an input signal, based on clock in, to

an output signal, based on clock out, which differ in frequency.

One skilled in the art of communications would recognize the advantage of

using the system and method of LaVigne to retime a single signal from node to node in

a multi-hop network to reduce the jitter that would otherwise accumulate from node to

node as suggested by the applicant (see p. 2 background). It would have been obvious for one of ordinary skill in the art at the time of the invention when presented with the retiming system of LaVigne, to use retiming features of LaVigne for one input channel and one output channel, in order to be able to improve the jitter performance in a multi-hop data network.

2.　　Regarding claim 2, LaVigne discloses the limitation wherein comparing the read and write pointers to determine a number of storage locations by which the write pointer leads the read pointer is not performed each time one of the storage locations is read (col. 4 lines 51-53: only permissible to modify FIFO if locations contain fill words, such as IDLE or CONFIG, not if the storage location contains data).

3.　　Regarding claims 3, 18, LaVigne discloses limitation wherein the control logic is configured to compare the positions of the read and write pointers when one of the pointers has a value of 0 (col. 4 lines 31-33: idle and config (fill words) are always in the first byte. I.e., byte 0, location 0.)

4.　　Regarding claims 4, 14, 23, 25, LaVigne discloses the limitation further comprising examining a plurality of words in the storage locations, detecting that one of the plurality of words is a fill word, wherein reading one of the storage locations twice (or more) comprises reading the storage location containing the fill word twice (or more), and wherein overwriting one of the storage locations comprises examining the plurality of words in the storage locations, detecting that one of the plurality of words is a fill word and overwriting the storage location containing the fill word (col. 5 lines 3-26).

5.   Regarding claim 5, LaVigne discloses the limitation further comprising

determining which of the plurality of successive words are fill words and for each of the

plurality of successive words providing an indication of whether the word is a fill word

(col. 6 lines 8-10, 14-16: system determines if FIFO contains IDLE or CONFIG fill

words. See also fig. 3 decision 120 and 140).

6.   Regarding claims 6, 9, 16, LaVigne discloses the limitation wherein providing the

indication comprises adding a bit to each word, setting the bit if the word is a fill word

and clearing the bit if the word is not a fill word (fig. 3 Yes/No flags out of fill word

decision boxes 140 and 120).

7.   Regarding claims 10, 19, LaVigne discloses the limitation wherein comparing the

read and write pointers to determine a number of storage locations by which the write

pointer leads the read pointer comprises determining a value for the number of storage

locations by which the write pointer leads the read pointer which is maintained for at

least one half of a clock cycle (fig. 2: neutral region 28).

8.   Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over LaVigne

et al. (US 6,289,066) as noted for claims 1-6, 9-10, 12-14, 16, 18-19, 21-27 above, and

in further view of Wang (US 5,563,891). LaVigne discloses a system and method for

retiming of input and output signals of different frequencies, as noted for the above

claims. LaVigne does not explicitly disclose that the pointer adjustments can be based

on the difference (subtraction) between the read pointer and write pointer.

Wang, in the analogous field of communications, discloses that the pointer

adjustments can be driven from the difference between the read pointer and the write

pointer (fig. 6 SYNCHRONIZER: write pointer 115, read pointer 125, comparison cir

130, phase difference, justification circuit 135, feedback thru gate 145, input to RD

pointer 125).

One skilled in the art of communications would recognize the advantage of using

the difference between the pointers to simplify the design used to determine the

required pointer adjustment. It would have been obvious for one of ordinary skill in the

art at the time of the invention when presented with the pointer difference of Wang, to

use the pointer difference feature of Wang in the retiming system of LaVigne, in order to

simplify the design.

9.   Claims 7, 8, 11,15, 20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over LaVigne et al. and Wang as noted for claims 1-6, 9-10, 12-14, 16, 17,

18-19, 21-27 above, and in further view of Parruck (US 5,331,641). LaVigne discloses a

system and method for retiming of input and output signals of different frequencies, as

noted for the above claims. Wang teaches the use of subtraction between the pointers

to determine the pointer adjustment. LaVigne and Wang do not teach multiple buffer

thresholds, priority and delay.

Parruck, in the analogous field of communications, discloses a method and apparatus in which pointer adjustments are based on multiple buffer thresholds and priority based on delay (fig. 3). Pointer adjustments are implemented with higher priority if the hard limit (high threshold) is crossed. In this case, the pointer adjustment is applied after frame count > short (predetermined short delay), Pointer adjustments are implemented with low priority if the soft limit (low threshold) is crossed. In this case, the pointer adjustment is applied after frame count > long (predetermined long delay).

One skilled in the art of communications would recognize the advantage of using multiple thresholds, priority and delay features in a retiming system to improve performance. It would have been obvious for one of ordinary skill in the art at the time of the invention when presented features of Parruck, to incorporate the features of Parruck, in the retiming system of LaVigne, in order to improve the performance of the system.

Citation of Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mejia (US 6,625,241) discloses a synchronizer for Fiber Channel applications. Crandell et al. (US 4,873,703), Williams et al. (US 5,084,841), Susnow (US 6,594,329), Parruck et al. (US 5,142,529), Smith (US 4,839,893), Trischitta et al. (Artech House) disclose arrangements for synchronizing data between clocks of different frequencies.

Examiner Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence Baranyai whose telephone number is (703) 305-8707. The examiner can normally be reached on Monday-Thursday: 6:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703) 308-6602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lb

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